Date—Jan., 1881.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots	
1, 11 a. m.....	0	0	0	0	0	0	4	10	
2, 10 a. m.....	1	1	0	0	1	1	5	11†	
3, 12 m.....	1	2	1	1	1	2	5	12†	Faculæ.
12, 8 a. m.....	0	0	.....	.....	0	0	1	3	Faculæ.
17, 4 p. m.....	3	15†	.....	.....	.....	.....	3	15†	
18, 9 a. m	1	5	0	0	0	0	4	20†	Faculæ.
22, 4 p. m....	0	0	.....	.....	0	0	1	3	Faculæ.
23, 10 a. m.....	1	5	0	0	0	0	2	8	
4 p. m.....	1	12	0	0	1	4	3	20†	Faculæ.
24, 8 a. m.....	0	0	0	0	0	0	3	20†	
26, 9 a. m.....	1	10	0	0	0	0	4	35†	Faculæ.
4 p. m.....	0	5		0	0	0	4	40†	
27, 9 a. m.....	2	10		0	0	0	6	50†	Faculæ.
28, 10 a. m.....	1	5		0	0	0	7	55†	Broad areas of faculæ.
4 p. m.....	0	0		0	0	0	7	55†	
8 a. m.....	1	20	3	20	1	5	5	55†	

† Approximated.

Mr. William Dawson, at Spiceland, Ind., reports: 1st, 5 groups, 11 spots, one large spot close to east edge; air bad. 7th, 1 group, 3 spots, two large spots nearly north of center; air bad. 8th, one group, 4 spots; air very bad. 10th, one group, 6 spots; air bad. 11th, 2 groups, 9 spots, one group 3′ from west edge; the other group with faculæ at east edge; air pretty good. 17th, one group, 2 spots; both large, half way from centre to NW. margin. 24th, 3 groups, 23 spots; two large spots south of centre. 28th, 5 groups, 66 spots; one large spot near west edge; five spots, all very prominent; air good.

Mr. H. D. Gowey, at North Lewisburg, Ohio, says: "Observed sun spots on the 1st, 2nd, 7th, 8th, 10th, 26th and 27th.

Mr. David Trowbridge, Waterburg, N. Y., reports: "No sun spots observed; too cloudy."

NOTES AND EXTRACTS.

[Read before the National Academy of Sciences, New York, Nov. 18, 1880.]

CONTRIBUTIONS TO METEOROLOGY, BEING RESULTS DERIVED FROM AN EXAMINATION OF THE OBSERVATIONS OF THE UNITED STATES SIGNAL SERVICE, AND FROM OTHER SOURCES; BY ELIAS LOOMIS, PROFESSOR OF NAT. PHIL. IN YALE COLLEGE.

* * * * * * * *

American Storms Advancing in a Southeasterly Direction.—During the colder months of the year, storms while crossing the United States frequently advance, during a portion of their course, in a direction from northwest to southeast. This direction is not confined to any particular section of the country, but occurs most frequently in the region between the Rocky Mountains and the Mississippi River. This course is seldom maintained as far south as the parallel of 30°, and after reaching its most southerly point, the storm frequently changes its course towards the northeast. The following table shows those cases in which storms have advanced towards the southeast as far as the parallel of 28°. The arrangement is similar to that of the preceding table. The first six columns describe each storm as long as its course continued southeasterly; the last column gives some indication of the subsequent course of each storm.

No.	Date.	Latitude. beg.	Latitude. end.	Longitude. beg.	Longitude. end.	Course.	Vel. miles	Subsequent course.
		°	°	°	°			
1	1871. Feb. 17.2–18.2	32	27	86	79	S.E.	21.8	Unknown.
2	April 15.3–16.3	41	26	101	89	S.E.	21.1	Unknown.
3	1875. Jan. 15.1–16.2	44	27	106	91	S.E.	27.1	Unknown.
4	1876. Feb. 3 – 4.1	33	28	98	80	S.E.	28.4	Unknown.
5	March 6.2–12.1	47	27	127	89	S.E.	15.7	Unknown.
6	May 6.3– 7.3	33	27	100	93	S.E.	25.0	Unknown.
7	1877. Jan. 4.2– 5.3	46	8	108	90	S.S.E.	40.4	N.E.
8	March 21.2–24.1	42	28	100	95	S.S.E.	22.5	N.E.
9	Dec. 19 –20	44	28	102	98	S.E.	10.0	N
10	Dec. 22 –27.2	47	27	102	95	S.E.	29.7	N.E.
11	1878. Feb. 1.1– 2.3	33	26	96	84	S.E.	18.3	N.E.
12	Aug. 20.2–24.2	38	22	83	81	S.S.E.	15.1	Became extinct.
13	Nov. 16.2–17.2	28	24	102	93	S.S.E.	24.0	N.E.
14	1879. Jan. 6.3– 7.3	38	27	110	98	S.E.	39.2	N.E.
15	Jan. 8.3–11.1	49	27	119	98	S.E.	30.4	N.E.
16	May 4.1– 6.1	34	24	101	96	S.S.E.	16.1	Became extinct.

We see from this table that the average velocity of these storms while pursuing their course towards the southeast, was twenty-four miles per hour, which differs but little from the average velocity of storms in other parts of the United States. The lowest latitude attained by any of these storms was 22½ degrees; and in only three cases did the low-centre reach the parallel of 25 degrees. In eight cases the storm centre, after completing its course towards the southeast, changed its course and preceded towards the north or northeast. In two of the remaining cases the intensity of the storm declined in advancing southward, and they apparently became extinct soon after the dates given in the table. The same was probably true in the six remaining cases, but the observations are not sufficient to establish this with certainty.

Storm No. 12 was quite peculiar, having pursued a path almost directly opposite to that of ordinary storms. During the afternoon of Aug. 20th, 1878, there was an area of low pressure (29.75) over West Virginia, being part of a greater depression whose centre was over Newfoundland, and there was a slight tendency to the formation of an independent system of circulating winds. Owing to a slight increase of pressure on the north side, this low area was crowded south-

ward, and in the afternoon of Aug. 21st assumed the character of an independent low area (29.78) with a feeble system of circulating winds. At 7:35 a. m. Aug. 22d this low centre had been crowded south to lat 30°, the greatest observed depression being now 29.88. After this the pressure increased, and the low centre could not be distinctly traced. This example appears to illustrate the general character of areas of low pressure, and shows that their progressive movement is not due to a simple drifting of the atmosphere, but rather to a diminution of pressure on one side of the low area and an increase of pressure on the other side. In the present case there was scarcely an appreciable diminution of pressure on the south side, and only a slight increase of pressure on the north side.

American Storms Advancing Northerly and Easterly.—The storms which cross the United States north of the parallel of 38 degrees, generally pursue a course a little to the north of east; while those which come from the region south of lat. 38 degrees generally pursue a course nearly northeast, especially in the neighborhood of the Atlantic coast. During the summer months few storm-centres travel south of the parallel of 38 degrees, and during this period the average course of storms is almost exactly towards the east.

The following table shows those cases in which storms have traveled northward and eastward, and came from a point as far south as lat. 26°. The arrangement of the table is similar to that of the preceding. Columns 3 and 4 show the position of the storm-centre at the beginning and end of the northeasterly motion, as far as indicated by the observations; column 8th shows the lowest pressure reported, and column 8th gives a brief indication of the previous course of the storm.

We see from this table that storms of this class occur most frequently in the autumn, and least frequently in summer. One of these storms began near lat. 20°; and seventeen of them began south of lat. 24°.

No.	Date.		Latitude. beg. end.	Long. beg. end.	Course.	Vel.. miles	Lowest Barom.	Previous course.
			° °	° °				
1	1872.	Nov. 6.1– 7.3	26–47	95–85	E.N.E.	60.4	29 71	Unknown.
2		Nov. 7.3– 9.3	25–30	95–78	E.N.E.	21.1	29.74	Unknown.
3		Dec. 9.2–18.3	26–47	101–57	N.E.	28.6	29.86	Unknown.
4		Dec. 23.2–27.2	25–44	95–58	N.E.	29.8	29.17	Unknown.
5	1873.	Feb. 19.1–22.1	21–45	98–64	N.E.	35.1	29.17	Unknown.
6		May 4.1–1 .1	24–43	98–81	N.E.	15.8	29.57	Unknown.
7		Sept. 18.1–20.1	24–34	92–94	N.E.	24.3	30.57	Unknown.
8		Sept. 22.3–24.1	25–36	86–72	N.E.	28.5	29.78	Unknown.
9		Oct. 5.1– 8.2	25 43	87–62	N.E.	32.9	29.02	Towards N.W.
10		Dec. 24.2–27.1	24–43	88–62	N.E.	30.4	29.37	Unknown.
11	1874.	Jan. 5.2– 9.1	25–49	87–68	N.N.E.	18.0	29.42	Unknown.
12		Feb. 7.2–11.1	23–46	82–58	N.N.E.	25.0	28.95	Towards N.W.
13		April 17.3–24.1	24–46	94– 9	N.& N.E.	29.7	29.86	Unknown.
14		Sept. 2.3–10.2	22–50	99–89	North.	21.5	29.47	Unknown.
15		Sept. 27.1–30.2	25–50	87–66	N.N.E.	26.0	28.94	Unknown.
16		Dec. 18.2–21.1	25–39	96–62	N.E.	34.6	29.33	Unknown.
17	1875.	Nov. 6.1– 7.3	25–31	98–78	E.N.E.	32.9	30.82	Unknown.
18	1876.	Oct. 19.1–21.1	21–32	82–72	N.N.E.	19.5	29.51	Not traceable.
19	1877.	Sept. 16.1–21.3	25–31	96–76	E.N.E.	10.7	29.40	Unknown.
20	1878.	Jan. 6.1–12.2	24–46	100–56	NE.	26.4	28.85	Not traceable.
21		Feb. 26.2–28.1	24–30	92–71	E.N.E.	31.1	29.71	Came from N.W.
22		March 17.1–17.2	23–25	85–78	E.N.E.	?	29.79	Not traceable.
23		March 19.3–22.3	25–27	95–78	East.	15.0	29.71	Came from W.
24		July 2.1– 2.3	25–27	85–78	E.N.E.	22.6	29.77	Not traceable.
25		Sept. 24 –33	15–32	76–61	N.& N.E.	10.1	29.70	Not traceable.
26		Oct. 21.1–24.2	29–38	81–57	N.& E.	27.5	28.83	Not traceable.
27		Nov. 18.3–20.1	22–44	97–57	E.& N.E.	24.5	29.83	Not traceable.
28		Nov. 17.2–21.1	24–47	93–57	N.E.	40.3	29.47	Came from N.W.
29	1879.	Nov. 19.1–20.3	23–49	74–60	N.N.E.	48.8	29.00	Not traceable.
30	1880.	Jan. 24 –28.1	21–36	86–75	North.	14.3	29.68	Not traceable.
31		March 7.3– 9.2	26–32	99–74	E.N.E.	38.0	29.86	Not traceable.
32		May 3.1– 6.2	26–47	93–59	N.E.	23.8	29.79	Unknown.
33		Aug. 19 –20	20–27	78–74	N.N.E.	12.4	29.86	Towards N.W.

Three of these storms had been traveling towards the northwest, previous to the dates given in the table, and two of them came from the Northwest; but in the other cases, the barometric depression was too small to allow us to trace their course previous to the dates here given. For most of the cases in the last half of the table this is clearly shown by the International Observations, and we may therefore infer it to be true in the other cases. As long as these storms continued south of lat. 30°, the barometric depression was generally small, but it increased as the storm advanced northward. In fifteen cases the barometer fell below 29.5 inches, and in four cases it fell below 29.0 inches. The average velocity of progress of these storm-centres while advancing northward and eastward was 26.9 miles per hour. From a comparison of these three tables we perceive that the American storms which originate between the equator and lat. 20° N., generally travel towards a point between north and west, but occasionally they advance almost exactly northward.

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Chief Signal Officer.

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